Trying out G4 production threshold cut for shower simulation in EMCal

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Production Threshold

- What is the best energy to stop tracking particles?

- Cut value for energy: once a specific value for energy is reached, the particles stop and the remaining energy is dumped at that point.
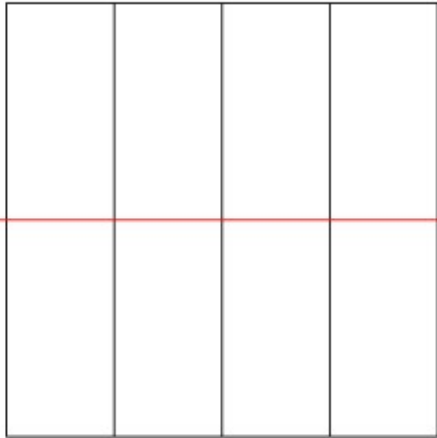
Production Threshold

- We can impose a production threshold (which is a distance).

- Geant4 default: 1 mm.

How does this work?

- Primary Particle loses energy by producing secondary particles.

- If the primary particle no longer has enough energy to produce secondaries which travel at least 1 mm, two things happen:

  - No more secondary particles produced.

  - The primary is tracked down to zero energy using continuous energy loss.
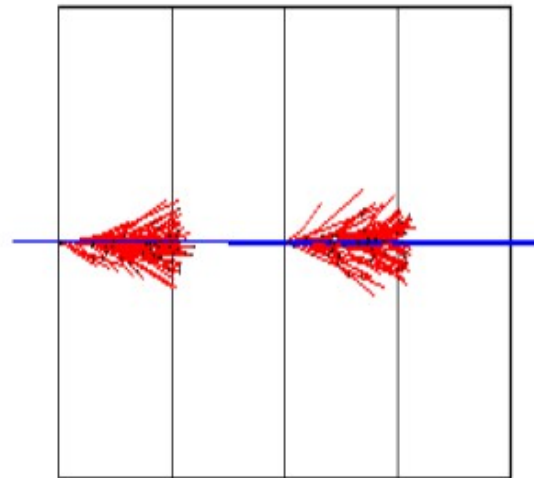
Production Threshold vs. Energy Cut

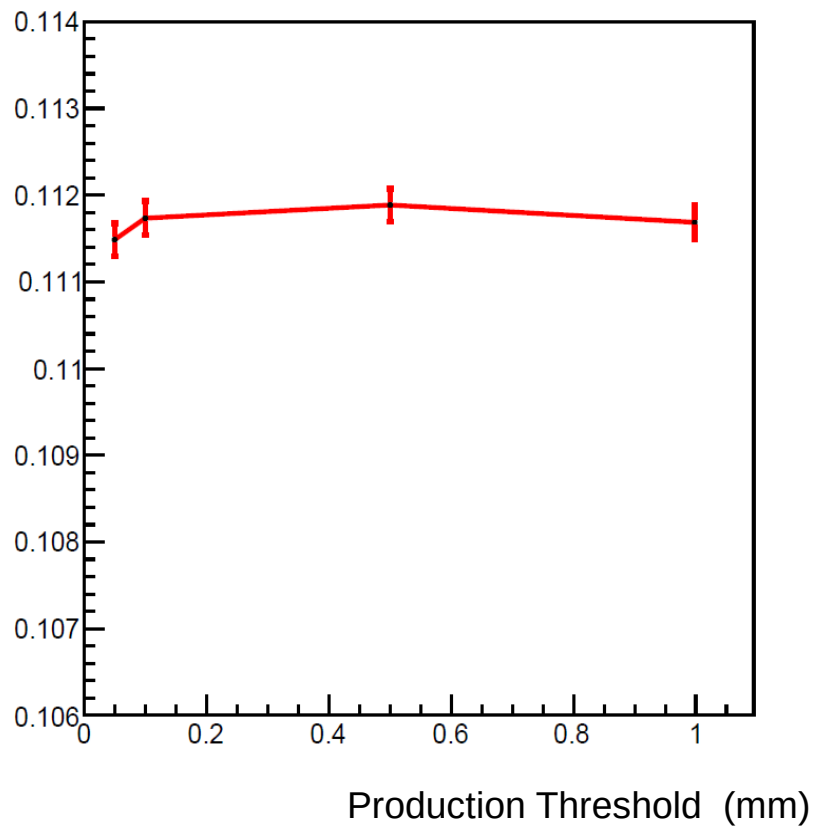500 MeV p in LAr-Pb sampling calorimeter

Cut = 2 MeV
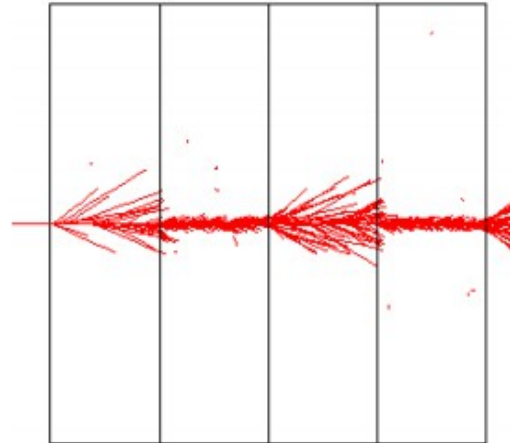
Cut = 450 keV

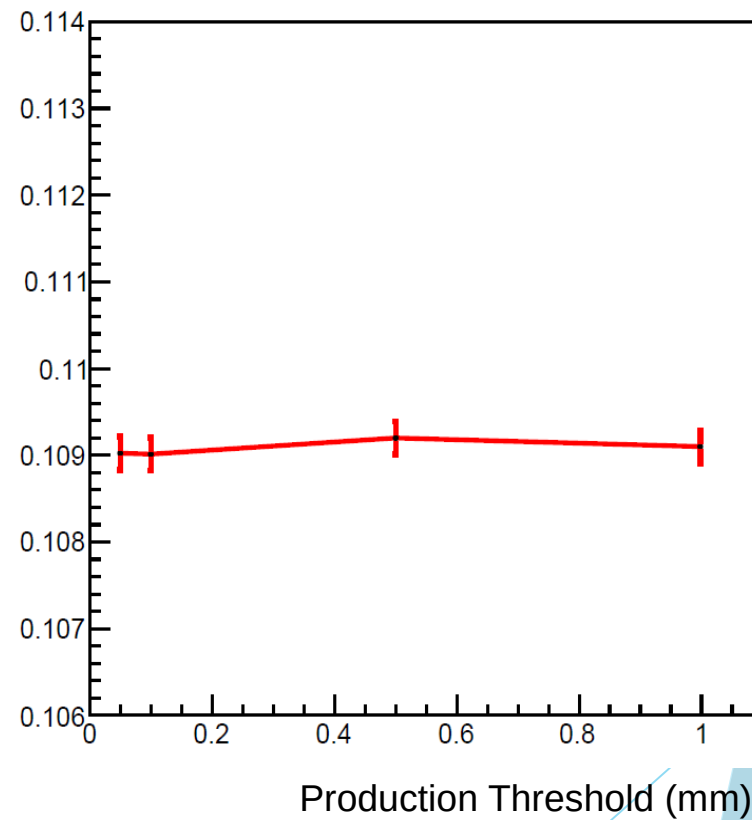Production range =1.5 mm

Gaussian Mean vs. Production Threshold

Energy Deposition Mean

Ligth Yield Mean

Conclusion

- The plot from previous slide show us that there is no dependency for energy deposition and light yield.

- The Geant4 default value is good enough for Spacal.